REMARKS

The application was filed with 43 claims, and all 43 claims are again presented for reconsideration. The amendments are directed solely to formal matters of spelling and confirmation of units of measurement, thereby addressing the objection to claims 18 and 36 and the rejection of claims 12-16 and 30-34 under 35 U.S.C. §112. As is conventional when discussing mill operations, chemical percentages are weight percentages based on the weight of the air dry pulp produced.

The present invention is directed to the introduction of chemicals to chemically pretreated lignocellulosic material immediately after refining in order to achieve, among other things, a comparable bleaching efficiency as when applying chemicals at locations upstream of and at the refiner. The introduction of chemicals downstream of a primary, secondary and/or tertiary refiner is utilized with the concept of applying chemicals such as alkaline peroxide pre-treatment to lignocellulosic material before refining. Preferably, the refiner has a highly pressurized case, for achieving the known benefits of high pressure refining.

A significant benefit of the invention is better chemical efficiency, by moving a greater number of chemical reactions downstream relative to conventional techniques, resulting from the relatively heavier or more intense addition of chemicals and/or chemical stabilizers at the post refiner intermediate line, especially blow line. A further benefit of the invention is the reduction in the detrimental effects of high temperature and/or other conditions prior to and during high pressure primary refining, which are known to influence pulp brightness and development.

With applicant's co-pending parent Application No. 10/483,638 that includes in one embodiment the step of introducing AP in a pressurized refiner, the temperature would likely be well above a level that if sustained in the intermediate line, would have a detrimental effect on the pulp or else reduce the effectiveness of the carry-over AP. Thus, the discharge should be quenched, to maintain the temperature of the pulp/AP mixture at about 80 deg. C. With the broadest aspect of the current invention in which no AP is introduced in the

refiner, less AP is present in the refiner (only carry-over from the AP pretreatment). Most of the AP is introduced in the post-refiner intermediate line, where the temperature will be well above 80 deg. C but the AP is not exposed to the much higher temperatures of the pressurized refiner. Thus, no quenching is needed. Even if in one of applicant's embodiments, some AP is introduced into the refiner as well as in the intermediate line, a heavier AP loading is at the intermediate line, where the deleterious effects of the high refiner temperature are not as severe.

Adding the last stage AP chemical at the blowline after the refiner according to an embodiment of the present invention was found to be more advantageous than adding the last stage AP at the "refiner eye" according to a method described in the parent application. This is likely due to: (a) the peroxide exposure to high temperature is shorter in the present method than in the parent method, which results in less peroxide loss; (b) the temperature between the plates in the refiner is much higher than that in the blow line; (c) the chemical more easily penetrates the fiber walls after they have been separated by refining; and (d) the velocity of the pulps in the blowline is high enough to give sufficient mixing actions for the chemicals and the pulps.

Example Set C of applicant's specification shows that when the chemical recipe and distributions are optimized, the alkali peroxide chemicals at the refiner chemical treatment stage can be applied at the intermediate line in a pressurized refiner system to achieve similar bleaching efficiency as preconditioning with AP followed by AP treatment in the refiner with conventional atmospheric inlet pressure. Because the residence time is very short in an intermediate line, the same process may also be used in a high pressure refining system, for example a refining system operating at 4 bar or higher.

Thus, according to the present invention, the advantage of pressurized refining can still be realized notwithstanding the high loading of AP solution before the primary pulp is retained in a bleaching tower. The prior art does not recognize the advantage of even the parent two stage AP treatment upstream of the bleaching tower (AP impregnation pretreatment plus AP at the refiner). The prior art certainly does not recognize the further improvement according to the

present invention, where the AP impregnation pretreatment is followed by pressurized refining (where the chips are exposed to very high temperatures without introduction of AP) and then the second stage AP treatment is achieved immediately after the refiner at a higher temperature than was customary for post-refiner AP treatment (i.e., typically below about 80 deg. C). Optionally, some AP can be introduced in the refiner.

Applicant notes that the temperature in the retention vessel, e.g., bleaching tower, does not have to be about 80C, and can be higher.

Claims 1-11, 17-29 and 35-43 were rejected under 35 U.S.C. §103 based on the disclosure of U.S. 4,486,267 (Prusas) as modified by the disclosure of U.S. 6,743,332 (Haynes). The examiner has acknowledged that Prusas does not teach the claimed steps of refining at superatmospheric conditions, adding AP to an intermediate line, and discharging and retaining the pulp in an intermediate line. Although Haynes discloses adding AP to the intermediate line while the primary pulp is above 80 deg. C, mixing, and discharging to a retention vessel, Haynes does not disclose any AP pretreatment upstream of the refiner.

As applicant recognized in the background of this patent application, it is known to operate a high consistency CTMP process, in which wood chips are softened, pressed, and impregnated with an alkaline peroxide solution, before refining. The examiner relies on Prusas for this disclosure. Although in one sense the steps are indeed shown, the inventive concept of Prusas requires a second pretreatment stage before refining whereby the impregnated chips are cooked at 120°C to 180°C for 28 minutes or so in a sodium sulfite solution, before introduction to the refiner. Moreover, there is no suggestion in Prusas, of a post-refining bleaching step. The examiner modifies Prusas with the Haynes reference, which shows AP introduction via line 262 (Figure 2) in the intermediate line between the refiner and the separating cyclone, followed by secondary refining and a bleaching retention tower. The examiner states that Haynes discloses that AP can also be introduced at the refiner.

The examiner then alleges that it would have obvious to one of ordinary skill to combine the AP pretreatment and refining of Prusas, with the post refiner AP treatment of Haynes, to arrive at applicant's claimed invention.

Applicant respectfully traverses this rejection. In the two cited processes of Prusas and Haynes, each focuses on different parts of overall processes that are not compatible for combination or integration. In essence, these are alternative systems, with no disclosure or suggestion in either reference, that a benefit could be gained by grafting on the extensive further equipment and process steps that are disclosed in the other reference, as attempted by the examiner. In essence, Prusas takes the extra trouble of cooking the impregnated chips in a sulfite liquor before refining, and therefore would not contemplate further bleaching downstream of the refiner. Moreover, none of his examples suggests further bleaching downstream of the refiner. Similarly, Haynes provides no teaching or even hint of AP pretreatment upstream of the first refiner; Haynes discloses introducing all the AP at and/or after the refiner, before the bleaching tower.

Furthermore, Haynes is not really concerned with optimizing the locations of the AP introduction. Instead, Haynes basically teaches that, regardless of where a designer has determined to introduce AP, an alkali buffer rather than sodium hydroxide should be used. This is clear in the first sentence of the Summary of the Invention, and in independent claims 1, 38, and 41. None of these recites any particular location where the bleaching liquor is to be introduced in the refining system. In fact, none of the 41 claims of Haynes recites a step that defines where the bleaching liquor is introduced in the refiner system. This cannot teach one of ordinary skill how to modify Prusas, by eliminating the crucial sodium sulfite cooking step of Prusas and substituting AP introduction in the intermediate line.

Neither of these references provides a nexus to the other such that one of ordinary skill in the art would, without applicant's own specification, recognize the surprisingly good results that can be achieved by combining the AP pretreatment upstream of the refiner, with AP introduction immediately after the refiner, especially in a system having a pressurize primary refiner.

For these reasons, Prusas and Haynes are not properly combinable, and the rejection of claims 1-11, 17-29, and 35-43 on this basis should be withdrawn.

Claims 12-16 and 30-34 were rejected under 35 U.S.C. §103 on the basis of Prusas and Haynes, further in view of the disclosures of three other patents or publications. These claims depend indirectly from one of the independent claims 1 or 21. At this time, applicant repeats the point that the fundamental basis for the rejection, the combination of Prusas and Haynes, is fatally flawed. Therefore, if the independent claims 1 and 21 are patentable over the combination of Prusas and Haynes under 35 U.S.C. §103, claims that depend directly or indirectly from claim 1 or 21 are likewise patentable under 35 U.S.C. §103.

Certain claims were also provisionally rejected for double patenting relative to the assignee's co-pending application No. 10/483,648 on Four Stage AP Mechanical Pulping. A Terminal Disclaimer has been filed in said co-pending application, such that the ownership of the two applications will remain in one entity and the maximum terms of the associated issued patents will be the same. A copy of the Terminal Disclaimer is enclosed, and should overcome the provisional rejection.

For the foregoing reasons, applicant believes all claims all claims are in condition for allowance.

Respectfully submitted,
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